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GEOGRAPHIC MEMORANDUM

THE ARCTIC

CIA/RR G/I 59-52

30 October 1959

CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

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GEOGRAPHIC MEMORANDUM

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CONTENTS

MAPS

25X1A

THE ARCTIC

I. Foreword

The Arctic is strategically important as a buffer and marchland between the Communist and Free World power blocs. It is also important as an area of scientific study and development that may help to solve many problems of the earth's physical environment. The Arctic contains untapped natural resources and open spaces that will be subject increasingly to settlement. Its further development will give rise to problems of international sovereignty differing from those in most other parts of the world.

To date the Soviet portion of the Arctic has reached a much higher state of development than the Free World portions. More has been done in the Soviet Arctic to increase man's ability to live under the inhospitable conditions and to develop economic resources. Over 1 million Soviet citizens now live in this area, whereas most of the Free World Arctic areas are only sparsely inhabited. The build-up of military potential in the Soviet Arctic and increase in the know-how of cold weather military operations have been rapid. Although utilizing similar advantages of geographical position, the development of military capability in the Canadian and US Arctic has probably not kept pace with that on the Soviet side.

II. Geographic Description

For purposes of this study the Arctic is defined as including northern portions of the mainland coasts of Eurasia and North America, their associated

archipelagos, Greenland, Svalbard, and the Arctic Ocean and its bordering seas. Iceland lies at the southern border of the region (see Map 1).* The over-all area totals 7.6 million square miles, of which 5.3 million are water.

The Arctic Ocean is landlocked except for the relatively broad passages into the North Atlantic between Greenland and Svalbard and between Svalbard and Norway; the several narrow passages southward through the Canadian Archipelago; and the Bering Strait-Pacific passage between Alaska and the Chukhotsk Peninsula. A slowly circulating mass of pack ice covers the Arctic Ocean and its bordering waters, a mass which retreats in its peripheral areas during the summer (see Map 2). Navigation is possible for only 2 or 3 months a year along the coasts of the land masses. The sole exception is along the coasts of Norway and near Murmansk, where a branch of the Gulf Stream keeps water unfrozen and permits year round shipping.

Land areas fringing the Arctic Ocean are, for the most part, low, broad coastal plains, the principal exceptions being the elevated, ice-covered interior of Greenland and a few mountainous areas near the coast in parts of both Eurasia and North America. Ice sheets similar to that of Greenland cover portions of the smaller Arctic Islands. Six principal rivers in the Soviet Union and one in Canada drain into the Arctic Basin. These rivers are open for navigation only in late summer. The northward orientation of both the rivers and the mountains in the Soviet Arctic has also blocked east-west expansion of land transportation lines.

* The land areas included are, in general, those north of the limit of tree growth. Maps referred to in the text are found at the back of the report.

Arctic climate places severe restrictions upon human activity within the region, and variations in Arctic air masses are thought to have an intimate relation to the weather and climate of more southerly latitudes. Throughout the region, no month has a mean temperature over 50°F.

Nearly all Arctic areas have a mean annual precipitation of less than 15 inches, most of which falls in summer. The amount of winter snowfall in general decreases from south to north, some Arctic islands being almost bare of snow in winter. High winter winds together with low temperatures cause extreme discomfort, and blowing and drifting snow impede both surface and air travel. Fog often blankets the sea and adjacent coasts in summer, the season otherwise best for flying. The long period of daylight in summer and the long night in winter also put a strain on residents of the region. Although not thoroughly understood as yet, the expansion and contraction of the oceanic ice with the seasons is believed to have an effect on the movement of polar air and of weather-creating air masses in bordering regions.

Permafrost underlies all Arctic land areas (except southern Greenland) to depths of 1,000 feet. It hampers such essential activities as construction projects and provision for water supply and sewage disposal. In summer, permafrost prevents natural drainage of the soil, causing innumerable shallow lakes and soggy areas that hamper overland movement and provide breeding grounds for mosquitos and other biting insects.

III. Strategic Position

A. The Soviet Arctic

The strategic position of the Soviet Arctic derives primarily from its proximity to North America. Heavy bombers and intercontinental ballistic missiles based in either the eastern or western extremities of the Soviet Arctic could reach any target in North America. In addition, the Soviet Arctic forms the first line of defense against a polar attack from North America. Radar facilities along the coast and on offshore islands form an early-warning line that provides complete coverage of the northern flank of the Soviet Union. Currently the heaviest concentrations of radar installations are at the eastern and western extremities.

B. The Non-Soviet Arctic

The non-Soviet Arctic similarly provides a first line of offense and defense against the Soviet Union. United States territory approaches closest to Soviet territory at Bering Strait.

Greenland, the Canadian islands and coast, and Alaska provide advance sites for early-warning radar, navigational aids, and weather stations. All major US targets in the Soviet Union would be vulnerable to attack by aircraft and missiles stationed in or near the North American and Greenland sections of the Arctic.

Although Svalbard is not currently under the effective control of either the US or the USSR, this inland group occupies a particularly favorable strategic position because of its proximity to established bases of both the USSR and the Western Powers and its proximity to the only Atlantic outlet

that the Soviets can use freely. The islands have port facilities suitable for emergency submarine and destroyer bases; a 5- to 6-month navigational season; and potential airfield sites. Soviet citizens are already established in strength on Svalbard because of a USSR coal mining lease and could probably take over the islands with little difficulty.

Greenland also occupies a key position between northeastern North America and northwestern Eurasia. It is relatively close to the North Atlantic shipping lanes and lies athwart a great circle route between industrial centers of the US and the USSR. Its terrain makes large-scale military development impossible on most of the island, but permanent ports, airfields, and electronic facilities are established in a number of places. Access from the sea is generally good on the southwest coast, where most of the ports are located.

IV. Military and Scientific Development

A. Soviet Arctic

Elements of the Soviet air forces are active in the Arctic. Exercises are conducted on a continuing basis in order to train crews and to test equipment. The frequency and extent of these exercises suggests growing logistic capability, including fuel storage facilities and a network of radar, navigational, and communications facilities. Aircraft of the Long Range Air Force, with home bases deep within the USSR, have forward staging bases located primarily on the Murmansk Peninsula and in the extreme northeast. Aircraft of the Northern Fleet Air Force are concentrated at Murmansk and Arkhangel'sk, and Tactical Air Force units are based at several points in the Soviet Arctic.

Naval units of the Northern Fleet are based in the Murmansk-Arkhangel'sk area. Not only the submarine fleet but also destroyers, cruisers, and motor-torpedo boats operate from the area; no naval units are based in the eastern Arctic because of logistic difficulties. Nuclear-powered missile-firing submarines would have a year-round capability and unlimited range in the Soviet as well as the non-Soviet sectors of the Arctic.

Soviet scientific activity in the Arctic exceeds that of any other country. It is significant not only for its own sake but also because it is a segment of a much larger and expanding program embracing the Antarctic and other regions and designed to yield essential information regarding the physical environment of the earth as a whole. The Soviet scientific program, which encompasses the entire Polar Basin environment from the ocean bottom to the upper atmosphere, has both economic and strategic implications. The benefits to shipping on the Northern Sea Route and to internal air traffic are obvious, but the same information also has a bearing on military polar flights, submarine operations, and guided-missile flights. Launching sites designed for high-altitude research and meteorological rockets may also be used to launch guided missiles. Polar weather forecasting, useful for civilian activities, could also be used for planning bomber attacks. Similarly, knowledge of under-water topography, sea currents, and ice movement is essential to submarine operations, and gravity observations have particular significance for improving Soviet capabilities in the positioning and navigational control of long-range missiles.

The Soviets have approximately 100 polar stations on their coasts and islands. To date, 8 stations have also been established on the drifting

pack ice. Other research activities have included high-latitude flights by groups of aircraft and oceanographic expeditions employing some 25 vessels (see Maps 3 and 4).

Through research and development the physical deterrents to man's occupation of the Arctic have been materially reduced, particularly in the Soviet Arctic. The operation of aircraft, land vehicles, and other equipment in subzero temperatures has been made possible by the development of special lubricants and fuels. Techniques for stabilizing permafrost have facilitated major construction undertakings. Modern cities have been built in the Soviet Arctic and their large populations have become accustomed to living and working in the Arctic.

B. The Non-Soviet Arctic

Military installations in the non-Soviet Arctic include many that the US and Canada have developed jointly, among them the DEW Line and Mid-Canada Line early-warning systems and their extensions into the Aleutians and Greenland. Airfields are found from Kotzebue, Alaska, to Thule, Greenland; and there are at least 11 aircraft refueling stations in Canada. Facilities for naval support include those of the Royal Canadian Navy, joint undertakings such as the Joint RCN-USN Oceanographic Research Station at Shelburne, N.S., and the Grondal Naval Base in Greenland. In addition to the normal meteorological installations, 5 advanced bases have been established in the Canadian Archipelago.

Scientific investigation in the non-Soviet Arctic has lagged well behind that of the Soviet portion. Nevertheless, a network of radio beacons and

weather stations has been established in the North American Arctic, and progress is being made in the automatic recording and broadcasting of weather and ice data. Among other developments, negotiations are under way for the use of a site on the northern Greenland icecap for testing a semimobile nuclear powerplant. Developments with direct military application include the voyages of atomic submarines and plans for submerged cable-connected sound-detection systems. The non-Soviet Arctic will probably become increasingly important as a target in missile testing.

V. Economic Development

A. The Soviet Arctic

The economy of the Soviet Arctic is based on the extracting or processing of natural resources -- chiefly minerals, fish, furs, and timber -- and on a small number of fabricating industries. Most of the products are shipped to foreign countries or other parts of the USSR. Lumber, pulp, and paper mills in Arkhangel'sk and Igarka process timber from forests south of the Arctic region. Within the USSR the Soviet Arctic ranks second to the Soviet Far East as a producer of fish and fish products. The shipbuilding industry, developed to support the Soviet Navy and fishing fleets, is centered at Murmansk and Arkhangel'sk. Arctic mines supply a significant part of the Soviet mineral production of copper, nickel, cobalt, tin, and coal.

Transportation is limited chiefly to water and air routes, although a few railroads are found in the western, more densely populated part of the Arctic. During the short summer navigation season, more than 500 vessels sail

on portions of the Northern Sea Route, but only a few make the complete transit. Civilian air transport routes connect most of the larger settlements with major cities to the south. The entire Arctic region has telecommunication connections with major communications centers in the south, using a system of wirelines in the European Soviet Arctic and radio telegraph farther east.

At present, over 1,000,000 people live in the Soviet Arctic -- north of the tree line. The population is concentrated in a few large commercial port cities in the European Arctic, such as Arkhangel'sk (256,000) and Murmansk (226,000); and in mining centers in the central Arctic, such as Vorkuta (55,000) and Noril'sk (106,000). Among the minor populated points are smaller mining towns, river ports, and military establishments. Large areas, however, are uninhabited except for small numbers of indigenes.

B. The Non-Soviet Arctic

The economy of the non-Soviet Arctic is less well developed than that of the USSR portions. Fishing and mining are the most stable sources of livelihood, although defense spending has increased economic activity in some areas. Fishing is a mainstay of northern Norway, Iceland, and Greenland. Deposits of minerals and mineral fuels occur throughout the Arctic, but few are rich enough or near enough to transportation to justify exploitation. The principal developed deposits include the iron of northern Norway, the coal of Svalbard, and the cryolite of Greenland. The rich Ungava iron deposits of Canada are in an early stage of development, but production has not begun. Hunting, once important to the inhabitants of the area, has declined as a source of income.

As in the Soviet Arctic, transportation by water and air in the non-Soviet Arctic is of outstanding importance. The development of both forms, however, is far behind that of the USSR. The airplane has opened up previously inaccessible areas, but the cost of air freight puts stringent limits on aircraft as a means of commercial transportation. Only in Northern Norway is there a developed road network. Most areas depend heavily on radio for communications. Canada has two port railheads on Hudson Bay, with connections southward. Norway's Narvik railhead furnishes an outlet for Sweden.

The chief characteristic of population distribution in the non-Soviet Arctic is its sparsity. Even the relatively dense settlement in northern Norway and Iceland cannot compare with the densities in some Soviet areas. The population of Svalbard is wholly imported, consisting of 2,500 to 3,000 Soviets and 1,000 Norwegians. Greenland has a population of about 25,000, strung out along the coast in more than 200 settlements. In Arctic Canada, about 10,300 Eskimos and 600 whites live in scattered settlements along the Arctic shores; the population of Arctic Alaska is also small and scattered. In both Canada and Alaska the number of persons stationed at defense installations is sizeable compared to the permanent population.

VI. Political Factors

A. General

Six states hold jurisdiction over the lands of the Arctic region: the United States (Alaska), Canada, Denmark (Greenland), Iceland, Norway, and the USSR. The sovereignty patterns that now exist are not being contested

actively, but in recent years recurrent disputes have arisen over fishing rights and the sector claims of Canada and the USSR have been questioned. New scientific/military developments with Arctic application (for example, the atomic submarine) have not yet given rise to disputes, but they have stimulated soul-searching among northern-hemisphere countries on such matters as the delimitation of territorial seas in the Arctic, the legal status of semipermanent installations on floating ice, "internationalization of the Arctic," and the possible need for international laws keyed specifically to polar-area conditions.

B. Sector Claims

Canada's claim, first set forth in 1925, includes all islands known or yet to be discovered within specified longitudinal limits and extending "right up to the pole." Canada, however, does not claim sovereignty in any form over the high seas within its sector.

The Soviet sector claim, apparently inspired by the Canadian, was put forward in 1926. It asserts Soviet sovereignty over all lands and islands discovered or to be discovered in the sector between 32°04'35"E and 168°49'30"W, except the area acknowledged to be foreign territory, namely Svalbard (see Map 3). In writings on the decree of 1926, Soviet jurists have gone beyond a mere claim to land; they claim as "open polar seas" (that is, seas having a status "nearly identical with that of territorial waters") all sea areas within the Soviet sector, as well as the airspace above them. Such a claim could have quasi-official sanction, but its interpretation is not known for

certain. Uncertainty as to what the Soviets claim in their sector has discouraged foreign activities in the area, a state of affairs the Soviets probably consider to their advantage. Fear of weakening their sector claim might make the Soviets very reluctant to discuss any form of "Arctic internationalization."

The United States, Denmark and Norway have not made sector claims and do not recognize any such claims or the sector principle.

In their extensive scientific activities on the Arctic pack ice the Soviets have not as a rule treated the claimed or unclaimed sectors of other Arctic countries as inviolate.

C. Territorial Waters and Fishing Rights

The Soviet Union claims territorial waters 12 nautical miles in width; the United States and Canada, 3 miles; Norway and Denmark, 4 miles; and Iceland, 4 miles plus an exclusive fishing zone of 12 miles. The Convention on the Territorial Sea and Contiguous Zone adopted by the 1958 Law of the Sea Conference gives much freedom to coastal states in the matter of drawing baselines from which to measure their territorial sea along coasts that are indented or island-bordered. How all Arctic countries will apply the terms of the convention and whether their decisions will be accepted by other countries is not clear. Uncertainty also surrounds the sweeping "internal waters" claims which the Soviets seem to have made for certain seas bordering their Arctic coast. The presence of ice makes it difficult to fix the location of the shoreline in many parts of the Arctic, and thus adds much uncertainty to the delimitation of territorial waters.

The dispute between the United Kingdom and Iceland regarding the latter's unilaterally declared 12-mile exclusive fishing zone has caused a vexatious break in NATO unity, which the USSR has been quick to exploit by propaganda and other means. A world trend toward wider exclusive fishing zones suggests that the Icelandic position may be upheld eventually. If so, many other fishing areas in the waters of Canada, Greenland, and northern Norway could become the subjects of disputes, to the detriment of NATO.

D. Problems of the Svalbard Area

Norway acquired Svalbard through a 1920 treaty to which the USSR is a party. Under this unique agreement, which called for complete demilitarization, no country (including Norway) may keep under surveillance the activities of the nationals of other treaty signers. Thus the Soviets are free to conduct mining operations and other activities. In 1944 the USSR demanded from Norway additional Svalbard rights, but these demands were rejected by the Norwegian government. The importance that the USSR attaches to Svalbard's position flanking the sea route to Murmansk is mirrored in these demands, in the overstaffed Soviet mining operations on Svalbard, and in the anti-NATO propaganda beamed specifically at Northern Scandinavia.

VII. Trends

Strategic considerations, population pressure, and a northward-pushing quest for food and raw materials, especially minerals, will draw the Arctic region increasingly into world affairs and bring about eventual absorption of the aboriginal peoples. The rich fisheries of the Arctic will decline in

importance if conservation measures are not applied. The development of conservation measures may encourage international cooperation in the area, but it could just as easily lead to disputes. The full potential of trans-Polar commercial air routes cannot be realised in the present two-world political context.

The role of the Arctic as a buffer between sharply divided blocs has caused consideration of international status for the region, with provisions for inspection. This idea apparently has considerable popular appeal and may acquire more if internationalisation is successful in the Antarctic. It would appear that "internationalisation of the Arctic" would be meaningful only if it included, for inspection purposes, the Arctic islands and coastal belts. Assuming reliable inspection, the wider the coastal belts the more effective would be the internationalisation. At this point it becomes difficult, if not impossible, to separate "Arctic internationalisation" from inspection-backed US/USSR disarmament. Until the USSR indicates a willingness to move toward inspection-backed disarmament, there would seem to be little advantage in attempting to give the Arctic a more "international" flavor than is already imparted, in theory, by its high-seas status.

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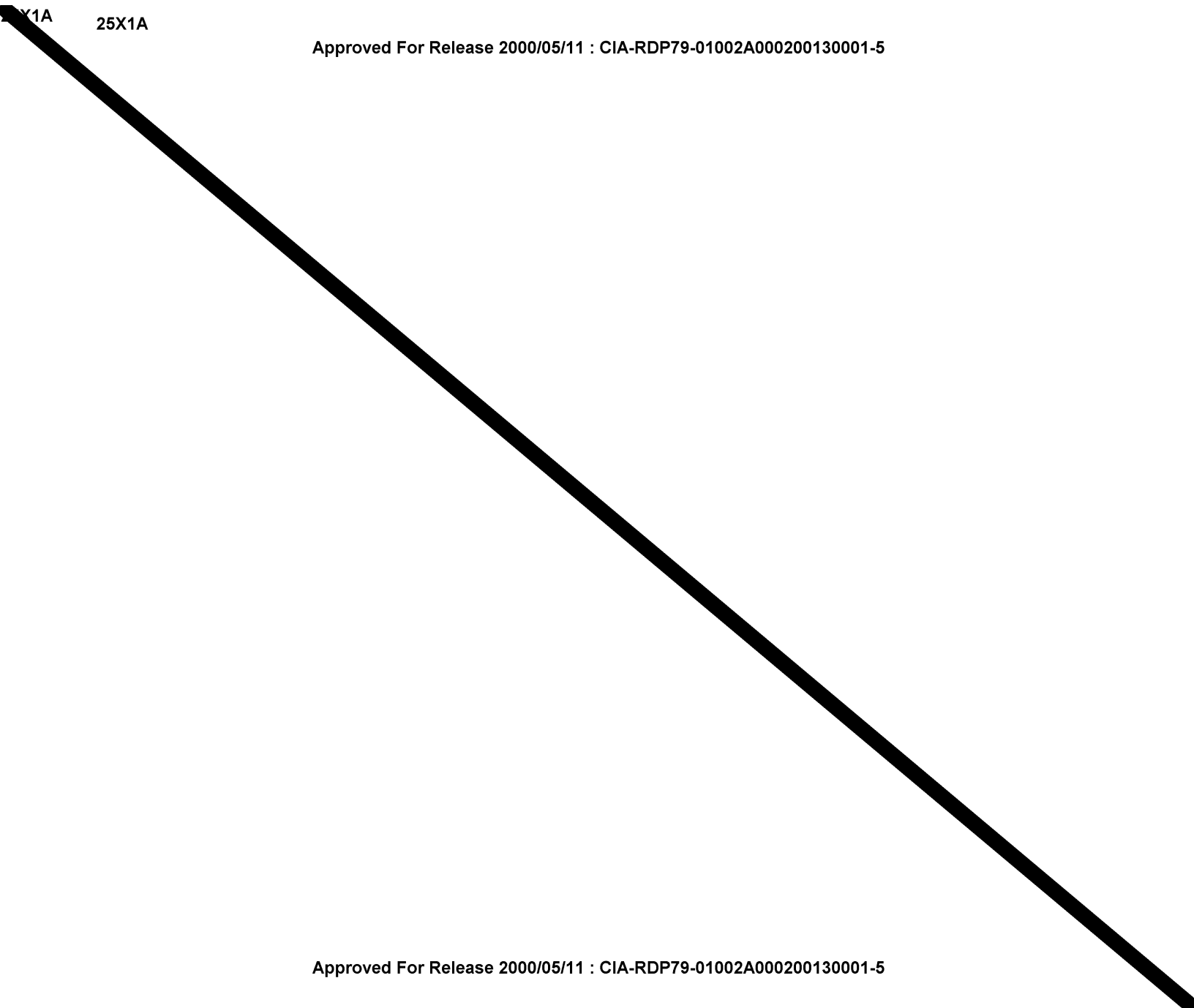

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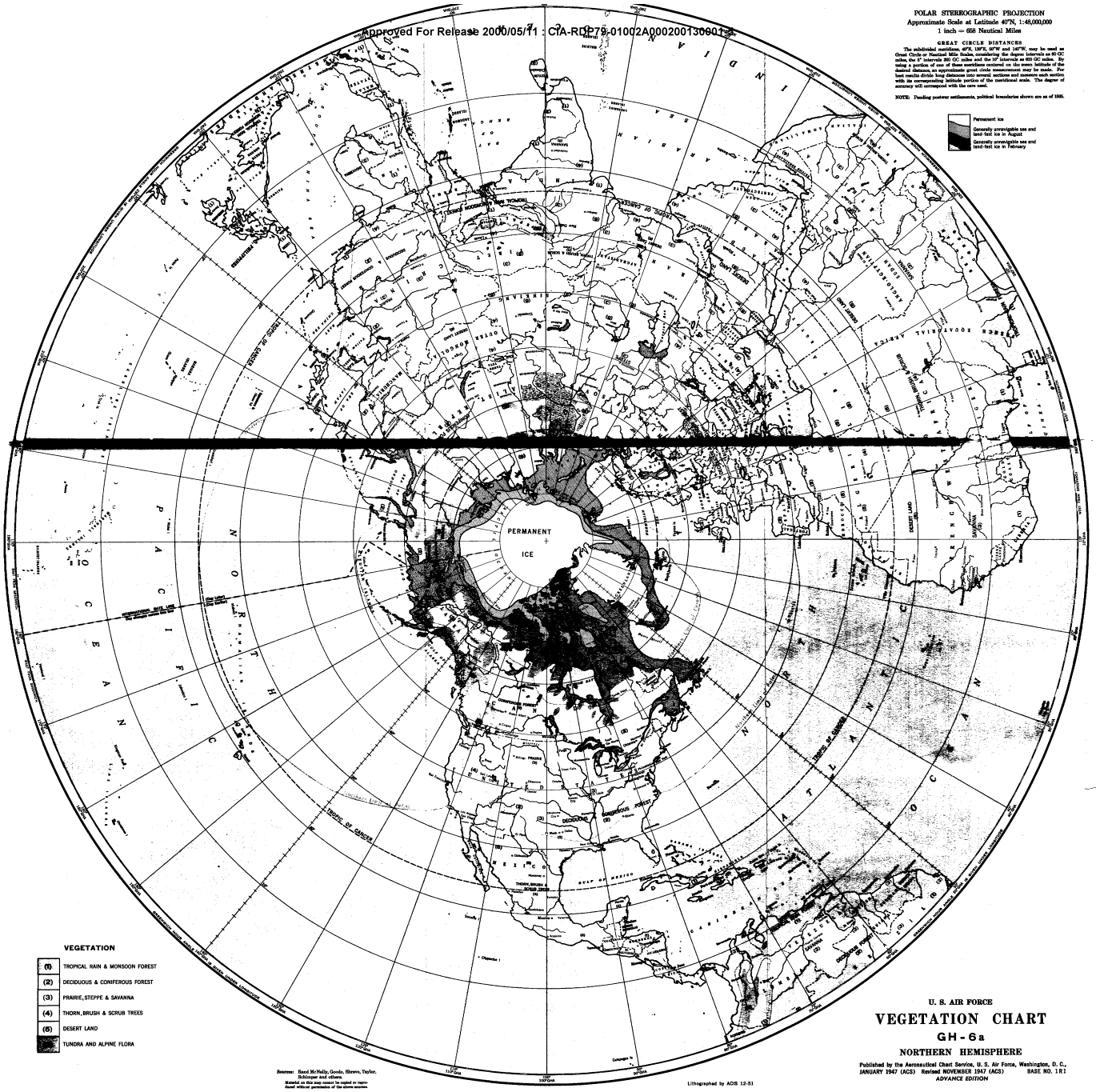

POLAR STEREOGRAPHIC PROJECTION
Approximate Scale at Latitude 40°N, 1:40,000,000
1 inch = 658 Nautical Miles

GREAT CIRCLE DISTANCES

The subdivided meridians, 40°S, 180°S, 50°W and 140°W, may be used as Great Circle or Nautical Mile Scales, considering the degree intervals as 60 GC miles, the 5° intervals 300 GC miles and the 10° intervals as 600 GC miles. By using a portion of one of these meridians centered on the mean latitude of the desired distance, an approximate great circle measurement may be made. For best results divide long distances into several sections and measure each section with its corresponding latitude portion of the meridional scale. The degree of accuracy will correspond with the care used.

NOTE: Pending postwar settlements, political boundaries shown are as of 1935.

Permanent ice
Generally unnavigable sea and land-fast ice in August
Generally unnavigable sea and land-fast ice in February

VEGETATION

(1) TROPICAL RAIN & MONSOON FOREST
(2) DECIDUOUS & CONIFEROUS FOREST
(3) PRAIRIE, STEPPE & SAVANNA
(4) THORN, BRUSH & SCRUB TREES
(5) DESERT LAND
TUNDRA AND ALPINE FLORA

Sources: Rand McNally, Goode, Shreve, Taylor, Schimper and others.

Lithographed by ACIS 12-51

U. S. AIR FORCE

VEGETATION CHART

GH-6a

NORTHERN HEMISPHERE

Published by the Aeronautical Chart Service, U. S. Air Force, Washington, D. C.,
JANUARY 1947 (ACS) Revised NOVEMBER 1947 (ACS) BASE NO. 1R1
ADVANCE EDITION

Map 2

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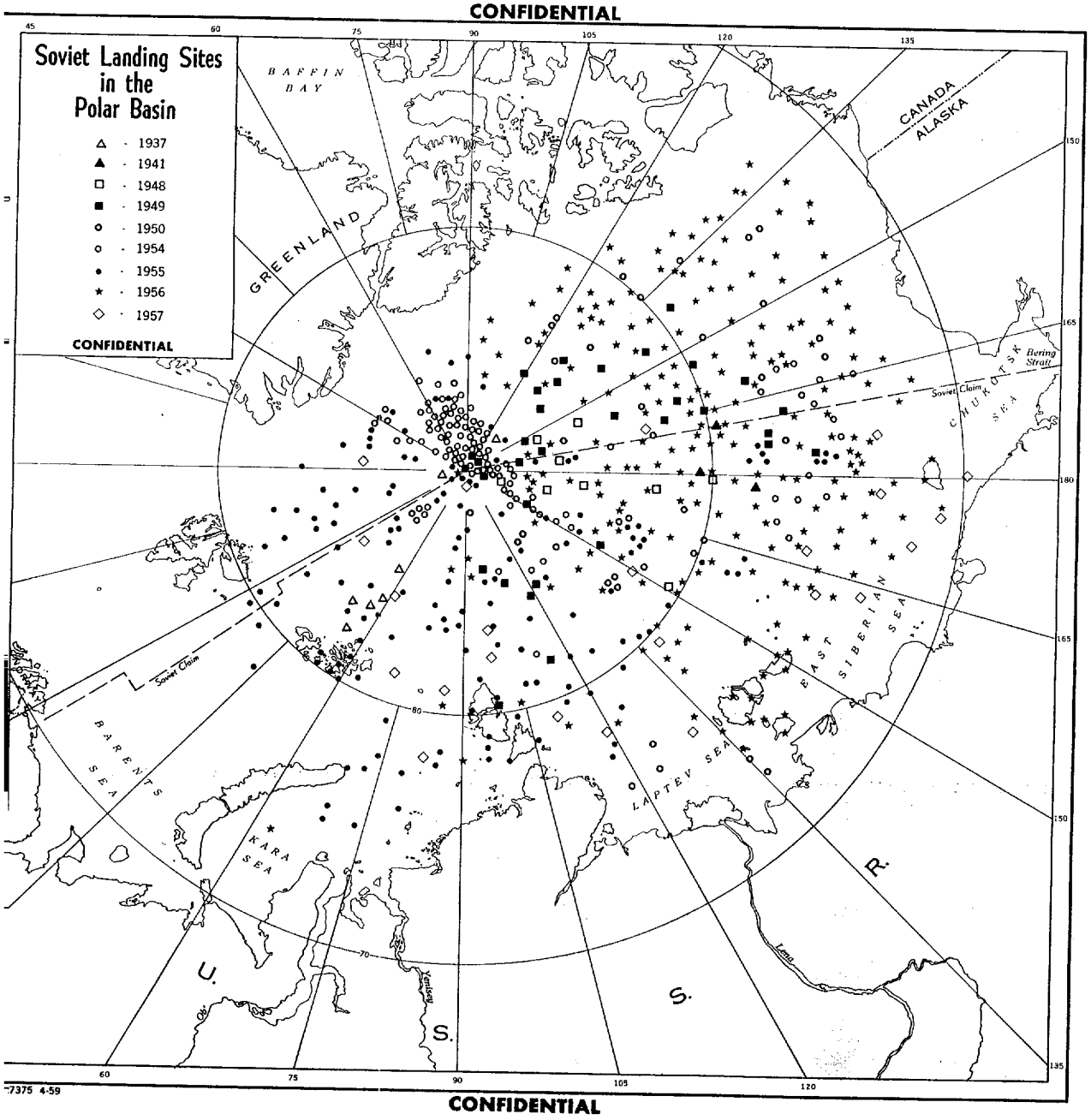

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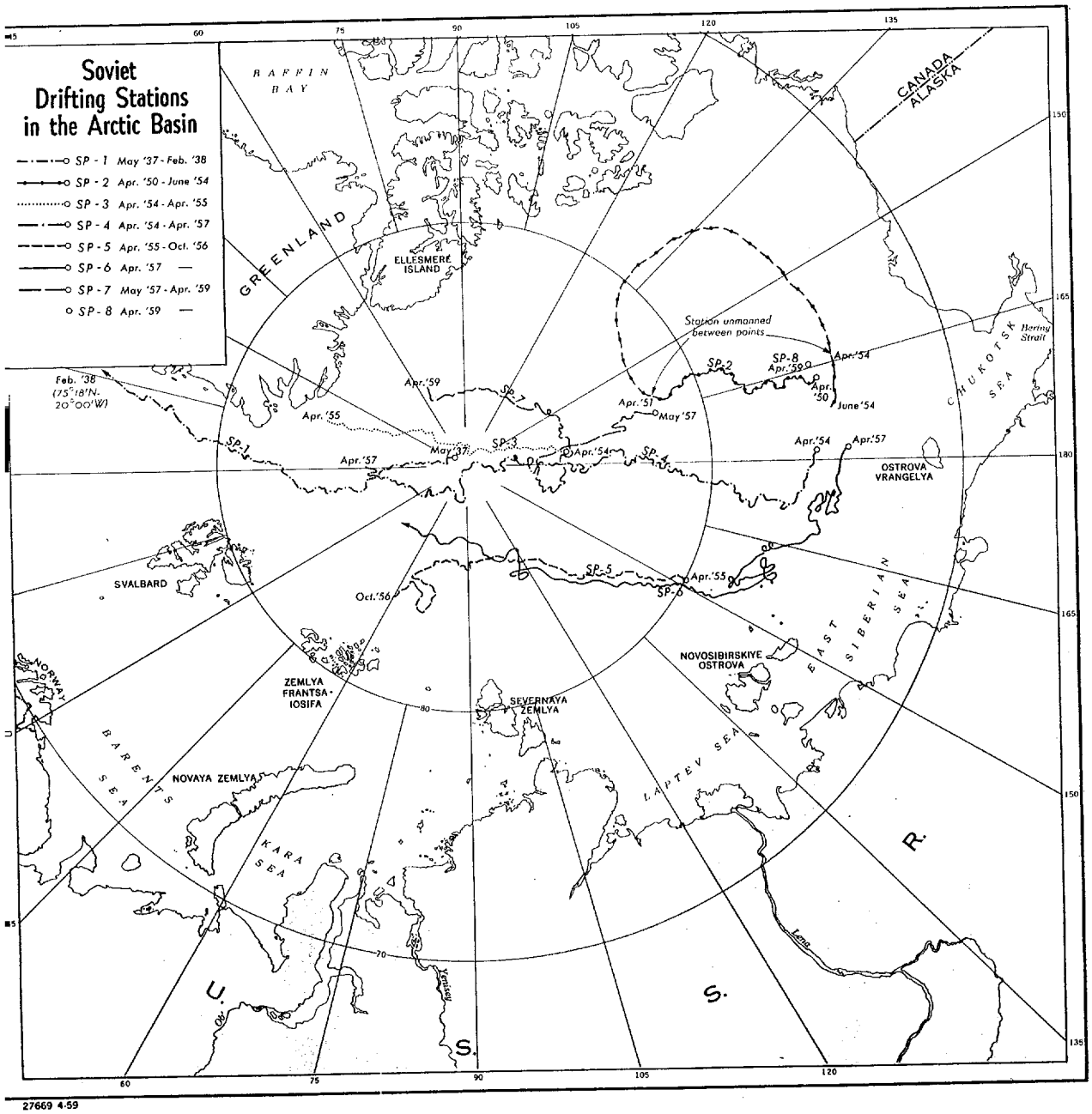
Map 3



Map 4

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The Arctic 30 Oct 59

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* None

See over

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Maps: [redacted]

Map 2 U.S. Air Force Vegetation Chart
GH - 6a Northern Hemisphere

Map 3 Soviet Landing Sites in the Polar Basin, CIA 27375

Map 4 Soviet Drifting Stations in the Arctic Basin
CIA 27669

CENTRAL INTELLIGENCE AGENCY
Geography Division, ORR

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Project Initiation Memorandum

To: Chief, Geographic Research

Project No.: 60.1813

From: Chief, Geography Division

Date: 26 October 1959

1. Subject of Proposed Project: (Is Code Required?)
   Comparison of Soviet and NonSoviet Arctic.
2. Statement of Problem: (Outline to be attached)
   To assess the assets, liabilities, strengths, and weaknesses of the Soviet Arctic as compared with the NonSoviet Arctic.

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3. Requester: Office of DCI
4. Responsible Analyst and Branch: [redacted] GG/E 25X1A
   GG/S
5. Kind and Extent of Cooperation Desired from:
   a. Other Divisions of the C Area (include maps):
      D/GC is to be responsible for possibly one map (not reproduced).
   b. D/GI Domestic Procurement:
   c. Other parts of CIA: E Area and possibly OCI
   d. Outside CIA:
6. Estimated Man Hours in D/GG: 80
7. Probable Completion Date: 30 October 1959
8. Probable Form of Final Publication: CIA/RR G/I 59-52
9. Recommendations Regarding Distribution of Finished Report: 25X1A
   Requester plus file copies.
10. Comments:

25X1A

[redacted]
Chief, Geography Division

Approved:

[redacted]
Chief, Geographic Research

29 Oct 59
Date

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Assistant Director, ORR

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